

PATENT ABSTRACTS OF JAPAN

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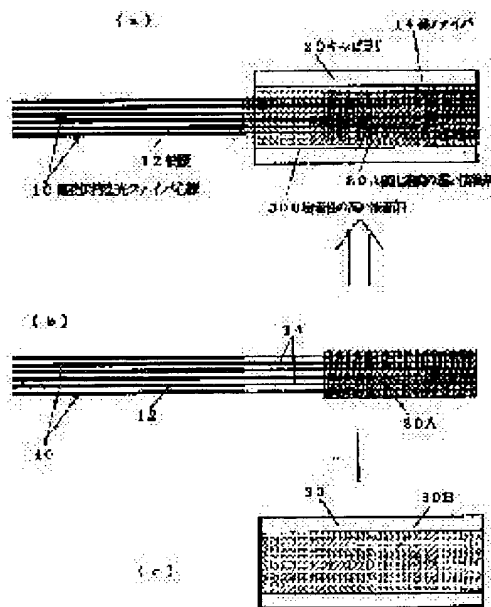
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(54) OPTICAL FIBER BUNDLE AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical fiber bundle which is unified in the angle of polarization axes with high accuracy and is high in tensile strength by using an adhesive which is slow in a curing rate in adhesion of optical fibers to each other and using an adhesive having a high adhesion property into the spacings exclusive thereof.

SOLUTION: The coatings 12 at the ends of polarization maintaining type coated optical fibers 10 are removed about several mm. A plurality of bare fibers 14 are bundled round and the portions of about 2/3 from the front ends are adhered to each other by the adhesive 30A which is slow in the curing rate. The polarization axes of the respective optical fibers are aligned to a specified direction by end face observation. The adhesive 30B having the high adhesion property is previously packed into a capillary 20 or is applied to the inside surface thereof and the optical fibers adhered to each other by the adhesive 30A which is slow in the curing rate are inserted therein. The adhesive 30b is then cured. The material of the capillary 20 is borosilicate glass or quartz, etc., and is formed of material transparent to UV rays at the time of using a UV curing resin.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The equipment with which this invention uses this about an optical fiber bundle of a polarization maintenance mold and its manufacture approach is used as components of the optical-signal-processing system using polarization.

[0002]

[Description of the Prior Art] Like drawing 2, two or more polarization maintenance type light FAIBA is adjusted in a capillary tube (capillary) 20, and it arranges so that the direction of polarization of each polarization maintenance mold optical fiber may gather at least in an end face, and the optical fiber bundle which comes to fill up adhesives 30 in a capillary tube 20 is proposed.

[0003] In addition, drawing 3 is the enlarged drawing having shown the end face of a bundle in model, and, as for a core and 16, 15 is [a clad and 18] the stress grant sections.

[0004]

[Problem(s) to be Solved by the Invention] There are items, such as a cure rate and adhesion, as a property of adhesives. In order to use it for bundle-ization of polarization maintaining optical fiber, a cure rate is slow and the high thing of adhesion is desirable. The reason is as follows.

[0005] If a cure rate is early, while the time amount which arranges the include angle of the polarization shaft of an optical fiber has been inadequate, adhesion hardening will be carried out, and the include angle of a polarization shaft cannot be arranged with high precision. Moreover, if adhesion is low, the problem that tensile strength falls will occur.

[0006] Generally the adhesives with high adhesion are hard to come to hand slow [a cure rate]. In order to arrange the include angle of a polarization shaft with a sufficient precision conventionally, adhesives with a slow cure rate were used. However, the adhesion of this kind of adhesives is also low. Therefore, the tensile strength in a product was low.

[0007]

[Means for Solving the Problem] This invention according to claim 1 is characterized by using high adhesives 30B of adhesion for the clearance between the parts and capillary tubes 20 by which adhesives 30A with a slow cure rate is used for adhesion of nakedness optical fiber 14 comrades, and adhesives 30A with the slow cure rate concerned is used for it so that it may illustrate to drawing 1.

[0008] It says about the condition of setting, for example in ordinary temperature (condition which is not heated), and not irradiating the light for promotion of hardening, UV, etc. as thing 1 late mode with the early cure rate of adhesives.

[0009] in addition -- being according to claim 2 -- like -- If adhesives 30A with a slow cure rate is used only about a part of die-length direction of the nakedness fiber 14 inserted into a capillary tube 20, since high adhesives 30B of adhesion will touch the part of others of the nakedness fiber 14 directly, tension strength becomes size more.

[0010] Moreover, invention of claim 3 sets besides a capillary tube 20 about the manufacture approach. Said optical fibers are pasted up by adhesives 30A with a slow cure rate. Arrange the direction of

polarization of each polarization maintenance mold optical fiber, and the optical fiber with which the above-mentioned direction of polarization was arranged exists in a capillary tube 20 after that. And it is characterized by changing into the condition that high adhesives 30B of adhesion exists in the clearance between a capillary tube 20 and adhesives 30A with said slow cure rate.

[0011] "The inside of the above-mentioned publication, the optical fiber with which the direction of polarization was arranged exists in said capillary tube 20. For it to change [and] into the condition that high adhesives 30B of adhesion exists in the clearance between the capillary tube 20 concerned and adhesives 30A with said slow cure rate" ** It is applied or filled up with high adhesives 30B of adhesion in the capillary tube 20. The optical fiber group which the direction of polarization was arranged in it, and was hardened by adhesives 30A with a slow cure rate is inserted, or the approach of filling up high adhesives 30B of adhesion with insertion and the back for an optical fiber with a syringe etc. previously in the ** capillary tube 20 is taken.

[0012] If nakedness fiber 14 comrades are pasted up by adhesives 30A with a slow cure rate, the direction of polarization of each polarization maintenance mold optical fiber can be arranged with high precision over many hours.

[0013]

[Embodiment of the Invention] The [object itself] In the edge of the polarization maintenance plastic coated fiber 10 of a book, about several mm and covering 12 are removed (drawing 1), and two or more nakedness fibers 14 in which it interfered are inserted into the capillary tube 20, where a polarization shaft is assembled. Capillary tubes 20 are boro-silicated glass, a quartz, etc., and in case the quality of the material uses ultraviolet-rays hardening resin, they use it as the ingredient which penetrates ultraviolet rays.

[0014] About 2/3 range will be mutually pasted up from the tip of the nakedness fiber 14 in a capillary tube 20 by adhesives 30A with a slow cure rate. About the adhesion of the adhesives used for this part, that value can use FC0708 (Dainippon Ink) etc. as adhesives with the slow (adhesion is usually low) cure rate which is not asked.

[0015] Parts other than the part of the nakedness fiber 14 hardened by adhesives 30A with the slow above-mentioned cure rate in a capillary tube 20 are filled up with high adhesives 30B of adhesion. In addition, especially about the cure rate of the adhesives of this part, R1159VN (JSR) etc. can be used as high (a cure rate is usually early) adhesives 30B of the adhesion which is not asked.

[0016] The covering 12 of the edge of the [process] polarization maintenance mold plastic coated fiber 10 is removed about 5.5mm. About 3mm part of each other is round pasted up for two or more nakedness fibers 14 by adhesives 30A with a slow cure rate from a tip in a bundle (drawing 1 (b)). Then, it sets and each optical fiber polarization shaft is arranged in the fixed direction by end-face observation.

[0017] It is filled up with high adhesives 30B of adhesion in a capillary tube 20, or applies to the inside (drawing 1 (c)), the optical fiber each other pasted up by adhesives 30A with the slow above-mentioned cure rate into it is inserted, and adhesives are stiffened.

[0018] Then, the tip of a capillary tube 20 is ground.

[0019]

[Example] FC0708 (Dainippon Ink) was used as adhesives 30A with a slow cure rate. In addition, this has low adhesion. Moreover, R1159VN (JSR) was used as high adhesives 30B of adhesion. In addition, this has an early cure rate. the conventional method -- and -- The sample by this invention method was manufactured and tensile strength was measured. this invention method was the structure of drawing 1 , pasted up the 3mm part by adhesives 30A with a slow cure rate from the tip of the nakedness fiber 14 in the capillary tube 20 with a die length of 5mm, and filled up other parts with high adhesives 30B of adhesion. The conventional method is the structure of drawing 2 and only adhesives 30A with a slow cure rate was used for it.

[0020] In addition, a polarization maintenance mold optical fiber is the so-called panda mold, and is an optical fiber of textile glass yarn.

[0021] As adhesives, it may be a room-temperature-setting mold, 1 liquid type, and 2 liquid type hybrid

model whether the thing of a photo-curing mold is used suitably. Moreover, an epoxy system and an acrylate system can be suitably used for the quality of the material.

[0022] A result is shown in the following table.

Prototype Tensile strength Include angle of a polarization shaft The conventional method 0.2kg < **2 degree This invention method 0.9kg < **2 degree [0023] It turns out that the tensile strength of the sample by this invention method is size.

[0024]

[Effect of the Invention] The include angle of a polarization shaft has gathered with high precision, and tensile strength can produce an adult optical fiber bundle.

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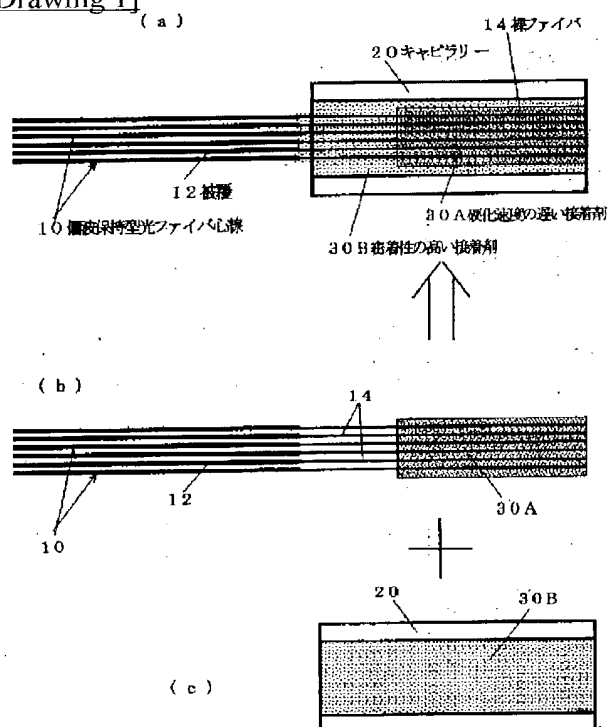
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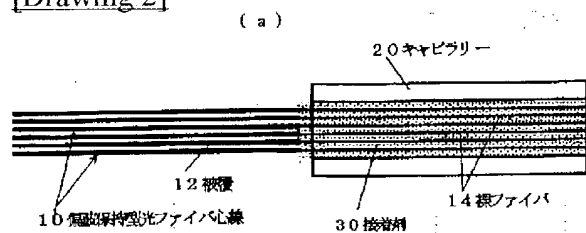
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DRAWINGS

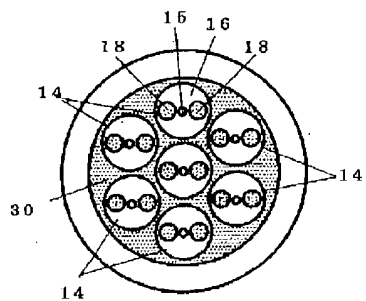
[Drawing 1]



[Drawing 2]



[Drawing 3]



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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] In the explanatory view of this invention, the condition as which (a) regarded the finished product from the side face, (b), and (c) show the condition in the middle of manufacture.

[Drawing 2] The explanatory view of the conventional technique.

[Drawing 3] The explanatory view to which the end face of the conventional optical fiber bundle was expanded.

[Description of Notations]

10 Polarization Maintenance Mold Plastic Coated Fiber

12 Covering

14 Nakedness Fiber

15 Core

16 Clad

18 Stress Grant Section

20 Capillary Tube

30A Adhesives with a slow cure rate

30B High adhesives of adhesion

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CLAIMS

[Claim(s)]

[Claim 1] It arranges so that two or more polarization maintenance type light FAIBA may be adjusted and the direction of polarization of each polarization maintenance mold optical fiber may gather at least in an end face in a capillary tube. In the optical fiber bundle which comes to fill up adhesives in said capillary tube The optical fiber bundle characterized by using high adhesives 30B of adhesion for the clearance between the part for which adhesives 30A with a slow cure rate is used for adhesion of said optical fibers, and adhesives 30A with the slow cure rate concerned is used, and said capillary tube.

[Claim 2] Adhesives 30A with a slow cure rate is an optical fiber bundle according to claim 1 characterized by being used only about a part of die-length direction of the optical fiber inserted into a capillary tube 20.

[Claim 3] Two or more polarization maintenance type light FAIBA is adjusted in a capillary tube. Are arranged so that the direction of polarization of each polarization maintenance mold optical fiber may gather at least in an end face, and face manufacturing the optical fiber bundle with which it fills up with adhesives in said capillary tube, and it sets besides said capillary tube 20. Said optical fibers are pasted up by adhesives 30A with a slow cure rate. Arrange the direction of polarization of each polarization maintenance mold optical fiber, and the optical fiber which was able to arrange the above-mentioned direction of polarization exists in said capillary tube 20 after that. And the manufacture approach of the optical fiber bundle characterized by changing into the condition that high adhesives 30B of adhesion exists in the clearance between the capillary tube 20 concerned and the part hardened by adhesives 30A with said slow cure rate.

[Claim 4] The manufacture approach of an optical fiber bundle according to claim 3 that the optical fiber inserted into a capillary tube 20 is characterized by pasting up mutually by adhesives 30A with a slow cure rate only about a part of die-length direction.

[Translation done.]